

Citation:

Rehm J, Patra J, Popova S. Alcohol-attributable mortality and potential years of life lost in Canada 2001: Implications for prevention and policy. *Addiction*. 2006; 101 (3): 373-384.

PubMed ID: [16499510](#)

Study Design:

Cross-Sectional Study

Class:

D - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To estimate the proportion of deaths 'caused' or 'prevented' by alcohol and premature deaths in Canada for the year 2001.

Inclusion Criteria:

Data were taken from the Canadian Addiction Survey (CAS) which was collected between 2003-2004 which was a randomly drawn sample of all Canadians taking age, sex, and region to avoid sample bias.

Exclusion Criteria:

Not stated.

Description of Study Protocol:**Recruitment**

- CAS was based on a regionally stratified two-stage (telephone household, respondent) random sample. The survey used random-digit-dialing methods via computer-assisted telephone interviewing. The sampling frame was based on an electronic inventory (Statplus) of all active telephone area codes and exchanges in Canada.
- Within selected households, one respondent aged 15 years or older who could complete the interview in English or French was selected according to the most recent birthday of household members. The selected individuals were interviewed by professional interviewers using a structured questionnaire.
- The sample was drawn randomly from the whole of Canada taking into consideration age, sex and region to avoid sample bias.

Design

Non-concurrent cohort study.

Dietary Intake/Dietary Assessment Methodology

Seven-day self-report alcohol intake.

Blinding Used

None.

Intervention

Not applicable.

Statistical Analysis

Sensitivity analysis. Different measures of alcohol exposure were used as a basis to estimate alcohol attributable mortality and PYLL:

- The seven-day-consumption protocol
- The usual quantity frequency (QF) measure, as indicated by the respondents
- A smoothed QF, where abrupt changes in prevalence of different drinking level categories between adjacent age groups were smoothed on the basis of the overall linear age distribution of volume of drinking
- A smoothed QF adjusted in a way that the overall volume in Canada corresponded to the per capita consumption, including unrecorded consumption. This measure corresponded to the best estimate of overall consumption in Canada, so it was considered the main measure of alcohol exposure.

Data Collection Summary:

Timing of Measurements

2003-2004.

Dependent Variables

- Quantity frequency (QF) measure, where usual frequency and usual quantity per drinking occasion were asked in separate questions and then combined to derive overall volume. A seven-day protocol was also used where, starting with the day before the survey, consumption of each of the past seven days was asked.
- Per capita consumption: Numbers were taken from the Global Alcohol Database (<http://www3.who.int/whosis>). As the CAS accounted for only 30% and 40% of the per capita consumption so they multiplied age and sex-specific prevalence rates by 2.7 to reflect the true per capita consumption based on the coverage rate of 36.6% or the QF alcohol-attributable fraction (AAF): Two methods.
- AAFs for chronic disease were calculated by combining exposure and relative risk (RR) estimates from meta-analysis. Relative risk denotes the ratio of the probability of developing, in a specified period of time, a disease among those exposed to alcohol, compared with the probability of developing this disease for abstainers. The RR for each condition was combined with different levels of alcohol consumption for each sex and age group and an attributable fraction was obtained based a formula.

- AAFs for injuries were based on direct estimates of alcohol involvement where available for Canada (traffic accidents; fire); and for other types of injury were based on results from the America A region derived by the comparative risk analysis of the Global Burden of Disease study. For injury categories, where they had no Canadian studies (e.g. falls), they based AAFs on the age and sex specific values of the America A region of the Comparative Risk Analysis (CRA) of the Global Burden of Disease study.
- Mortality data: Data for Canada in 2001, with the underlying cause coded according to the International Classification of Diseases version 10 (ICD-10), were obtained from Statistics Canada
- Potential years of life lost (PYLL): PYLL due to death in Canada has been calculated for each age group (zero to 14, 15-29, 30-44, 45-59, 60-69, 70-79 and 80+ years) by multiplying the number of deaths by the interpolated life expectancy for the observed mean age at death in the interval. The upper age limit of 76.0 years for males and 81.5 years for females was used to approximate the life expectancy of Canadians for both sexes at birth. PYLL were calculated per population of 100,000.

Independent Variables

- Drinking category
- Age
- Sex.

Drinking Categories	Females	Males
Abstainer or very light drinker	zero to <0.25g per day	zero to <0.25g per day
Drinking category I	0.25 to <20g per day	0.25 to <40g per day
Drinking category II	20 to <40g per day	40 to <60g per day
Drinking category III	40+ g per day	60+ g per day

Control Variables

None reported.

Description of Actual Data Sample:

- *Initial N*: 13,909
- *Attrition (final N)*: 47% response rate
- *Age*: 15 years and older
- *Ethnicity*: Canadian
- *Other relevant demographics*: Data were not reported
- *Anthropometrics*: Data were not reported
- *Location*: Canada.

Summary of Results:

- On average, men consumed more alcohol than women and alcohol consumption decreased with age
- The overall average age for an alcohol-attributable death was 45.9 years for men and 58.8

years for women

- 3,892 alcohol-attributable deaths were estimated accounting for 3,313 deaths among men and 579 among women. These numbers were derived by multiplying AAFs with number of deaths for each category, thereby producing numbers with decimals.
- Among deaths caused by alcohol, the three biggest contributors were unintentional injuries, malignant neoplasms and digestive diseases
- With respect to single disease categories, cirrhosis of the liver, motor vehicle accidents, suicides/self-inflicted injuries, oesophageal cancer and cardiac arrhythmias constituted the largest alcohol-attributable categories
- The PYLL rate for Canada for deaths due to alcohol was 769 per 100,000 for men and 203 per 100,000 for women aged zero to 80+ years. This means that for every 100,000 people in the population, there was a potential loss of 769 years of life among men and 203 years of life among women as a result of premature death due to alcohol. A high PYLL rate for men was observed, indicating higher levels of premature mortality among men compared to women.

Author Conclusion:

Alcohol consumption in Canada resulted in a considerable burden of mortality and disease. The disease burden is only part of the overall alcohol-related burden, and is actually considerably smaller than social harm in some regions.

Reviewer Comments:

The author's noted the following limitations:

- *Exposure is difficult to measure. This study had relatively good per capita estimates, but the distribution by sex and age were derived from surveys. The surveys account for 50% or less of sales/production figures.*
- *The estimation of risk relations for chronic disease do not take into account patterns of drinking. Drinking patterns may change and the risk of chronic disease may differ depending on level of consumption.*
- *The age specificity of relative risks between exposure and outcomes should be taken into consideration.*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

- | | | |
|----|---|-----|
| 1. | Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies) | Yes |
| 2. | Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about? | Yes |

3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	N/A
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions

1.	Was the research question clearly stated?	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	Was the selection of study subjects/patients free from bias?	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	No
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	Were study groups comparable?	???
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	???
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	No
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	???
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A

3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	Was method of handling withdrawals described?	???
4.1.	Were follow-up methods described and the same for all groups?	???
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	No
4.4.	Were reasons for withdrawals similar across groups?	???
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	Was blinding used to prevent introduction of bias?	No
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	N/A
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	No
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?	???
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	N/A
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	N/A
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	No
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A

6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	Yes
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	Were outcomes clearly defined and the measurements valid and reliable?	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	???
7.6.	Were other factors accounted for (measured) that could affect outcomes?	No
7.7.	Were the measurements conducted consistently across groups?	???
8.	Was the statistical analysis appropriate for the study design and type of outcome indicators?	No
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	N/A
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	No
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	No
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	No
9.	Are conclusions supported by results with biases and limitations taken into consideration?	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	Is bias due to study's funding or sponsorship unlikely?	Yes

10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes